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DEEP REACTIVE ION ETCHING PROCESS AND MICROELECTROMECHANICAL DEVICES FORMED THEREBY

ABSTRACT OF THE INVENTION

A process for forming a microelectromechanical system (MEMS) device by a deep reactive ion etching (DRIE) process during which a substrate overlying a cavity is etched to form trenches that breach the cavity to delineate suspended structures. A first general feature of the process is to define suspended structures with a DRIE process, such that the dimensions desired for the suspended structures are obtained. A second general feature is the proper location of specialized features, such as stiction bumps, vulnerable to erosion caused by the DRIE process. Yet another general feature is to control the environment surrounding suspended structures delineated by DRIE in order to obtain their desired dimensions. A significant problem identified and solved by the invention is the propensity for the DRIE process to etch certain suspended features at different rates. In addition to etching wider trenches more rapidly than narrower trenches, the DRIE process erodes suspended structures more rapidly at greater distances from anchor sites of the substrate being etched. At the masking level, the greater propensity for backside and lateral erosion of certain structures away from substrate anchor sites is exploited so that, at the completion of the etch process, suspended structures have acquired their respective desired widths.